<u>EXHIBIT E</u>

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ultrix window manager

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X Window System Release 3 (Protocol Version 10) now available

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Jim Gettys View profile   More options Feb 14 1986, 11:49 am

Release 3 of the X **window** system is now being shipped from MIT.

For those of you not familiar with X, X is a portable network
transparent **window** system for bitmap display terminals that runs under
Berkeley Unix. X runs on DEC VS-100, VS1, VS2 and VS2/GPX displays;
also in this release is preliminary support for Sun workstations; our
thanks to Dave Rosenthal of Sun Microsystems for the Sun port. The MIT
distribution distribution includes code for the VS100, VS1, VS2 and Sun
workstations; device dependent VAXstation 2/GPX binaries come with the
Ultrix-32W product and are not available from MIT. This distribution
includes the device independent code for X and utilities developed
at MIT and a number of utilities developed elsewhere. Our thanks to
Digital for contributing the **Ultrix window manager**. Client programs
include a terminal emulator (~Vt102 and Tek4010), imagen previewer,
DVI previewer, clock, load monitor, several **window** managers,
window dumpe/undump, bitmap editor, demo programs and a few utilities
of various sorts.

IBM RT/PC code is in the works and should be available roughly
simultaneously as 4.2A from IBM. X DOES NOT RUN ON AIX (the
System V
based product). Other ports are in progress for several other
manufacturer's displays.

The cost is $100 and a copy of a Berkeley 4.2 source license. If you
have no urgent need for a distribution, X will come on the 4.3BSD
tape as user contributed software.

        Send requests for distributions to "xrequ...@athena.mit.edu",
or by U.S. Snail to:
        X Request
        Project Athena
        MIT E40
        77 Massachusetts Avenue
        Cambridge, Massachusetts 02139

                Jim Gettys
                MIT/Project Athena
                j...@athena.mit.edu

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Jim Gettys View profile   More options Feb 17 1986, 12:23 pm

At Brian Reid's request, we wish to acknowledge the great debt we have to
Paul Asente, Chris Kent, and Brian and his group group at Stanford in
the development of X, as well as many of the ideas embodied in the V
system.

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We (Jim Gettys and Bob Scheifler) started not quite two years ago with "W",
written by Paul Asente at Stanford for the "V" system, and then ported to
Unix on the Vs100 at DECWRL by Paul Asente and Chris Kent. Without W, it is
very unlikely that enough momentum would ever have been generated at MIT
to develop an interesting **window** system under Unix, much less a network
transparent one like X. We think it is fair to say that had W never
existed, X would not exist today.

Indeed, the name "X" is due to the fact we started with "W". Paul Asente's
Chris Kent's work are acknowleged not once, but in a number of places in
the documentation. To our knowledge, no code remains from W at this date,
although some basic structure and a few algorithms survive. Paul's name is
not in the X server source; neither were they in the W server source we have
(the only part of X that has any W code in it); neither is Bob Scheifler's
name in the X server sources now. We are sorry if anyone feels slighted for
their contributions to X due to oversight on our part. We are not embarrassed
by the connection, but wish to acknowledge the heritage of ideas involved,
from V, to W, to X. We know of little better way than the name "X" to
recognize this.

Paul has since contributed much code to X, for which we are very greatful.
These include several library packages, modifications to the terminal
emulator, and one of the three existing **window** managers.

Brian is incorrect in a number of respects about "X"; while much of the model
of heirachical subwindows is due to W, X differs in substantial ways from W,
to the point that continuing to call it W would have been a misnomer. W is
based on a synchronous IPC protocol, which when W was ported to Unix had
severe performance consequences, due to Unix's relatively slow message
facilities. X however, while still based on a byte stream (e.g., TCP), is
based on an asynchronous message protocol; X clients only block when when
information is required from the server. This, along with buffering, accounts
for the up to 30x higher performance of X over what we started with (W under
Unix). In addition, W maintained display lists in the **window** system server,
which we maintain when needed in client programs only. This is a fundamental
assumption which has a large impact throughout the system. There are also
other substantial differences and additions between W and X, such as
transparent windows and color support.

If Unix in general is to survive in the developing distributed environment
it will have to take a large dose from the work done at Stanford, starting
with many ideas in the V system; X is only a small step in that direction.

<div align="center">

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